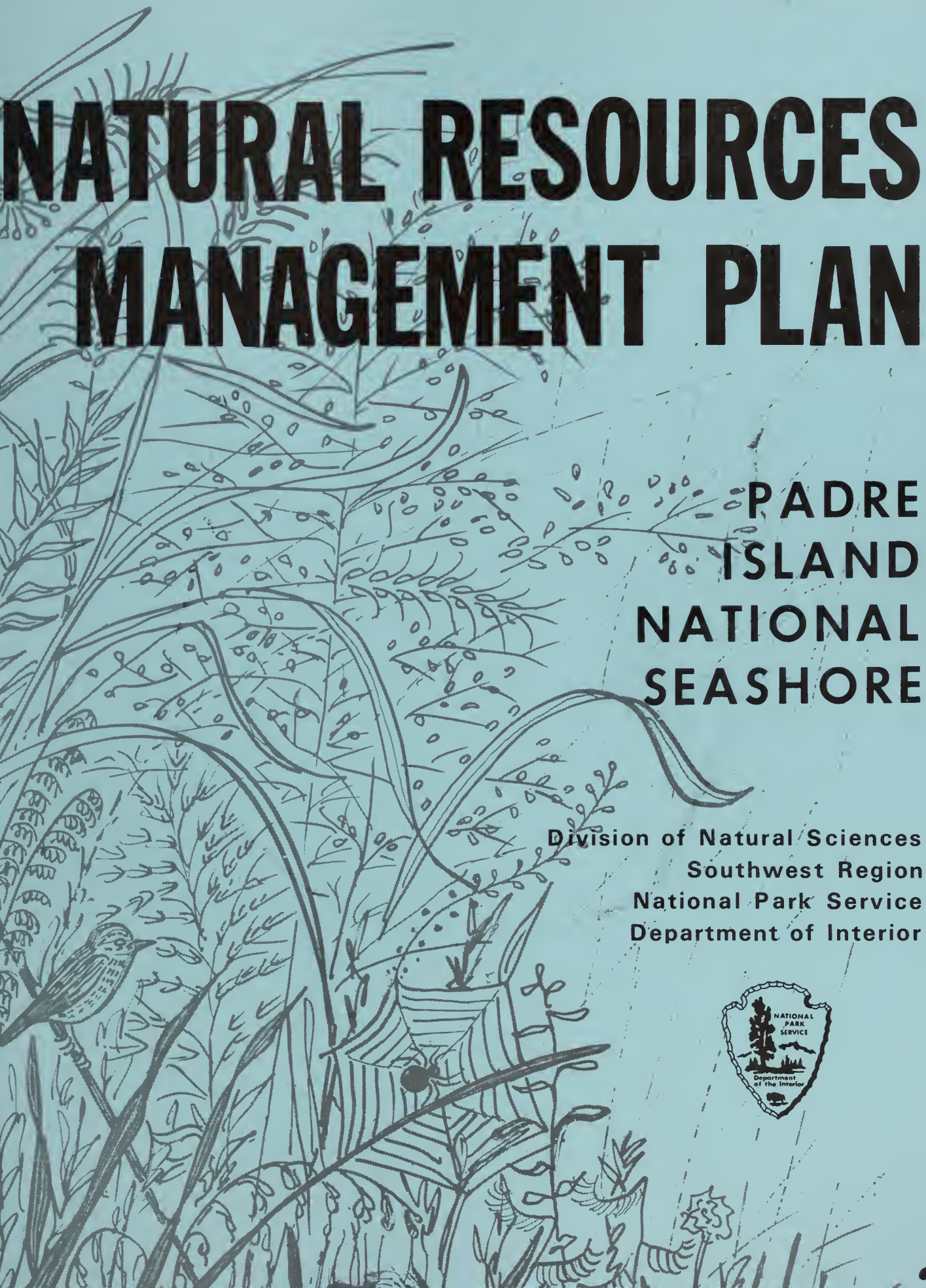
# NATURAL RESOURCES MANAGEMENT PLAN

## PADRE ISLAND NATIONAL SEASHORE

Division of Natural Sciences
Southwest Region
National Park Service
Department of Interior



# NATURAL RESOURCES MANAGEMENT PLAN

FOR

# PADRE ISLAND NATIONAL SEASHORE

December
1974

Prepared by: Padre Island National Seashore Staff and Southwest Region Office of Natural Science

Reviewed by: Southwest Region Offices of History, Archeology, Planning, Maintenance, Interpretation, and Resources Management

Approved for Implementation by: W R Thompson 12-23-74

ACTING Regional Director, Southwest Region

Fig. 1. WHEELING SEAGULLS AND SPACIOUS VIEW OF OCEAN AND SKY GIVE A SENSE OF FREEDOM AT PADRE ISLAND.
NPS Photo (Mang).

# NATURAL RESOURCES MANAGEMENT PLAN

A Natural Resources Management Plan is a strategic planning document and a key factor in good management and preservation of the resource.

This plan is a set of project statements which include proposed action for implementation as well as 5-year programming sheets for maintenance and research actions. Other sections of the plan serve as an introduction and a set of guidelines. Project statements are determined on the basis of approved Management Objectives and Land Classification. Management Constraints and Completed Research serve as guidelines for projects. The Plan serves the Superintendent in two ways: 1) as a manual for maintenance activities that will preserve the environment or achieve an environmental status quo to comply with Park Service Standards, and 2) a set of research projects and priorities that are designed to obtain additional information for management and interpretation.

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# I. MANAGEMENT OBJECTIVES

STATEMENT FOR MANAGEMENT AND PLANNING

## Purpose of the Park

Padre Island National Seashore was established as a National Recreation Area and the Resources Management Plan is designed to facilitate that purpose. Visitor use, however, must be compatible with the resource -- in this case the beach and dunes.

To that end, this resource proposal is a composite plan for maintaining and preserving the resource and enhancing the visitor experience by research on the physical, biological, historical, and archeological components of Padre Island.

The plan is also aimed at fulfilling applicable Congressional mandates for a National Recreation Area. Authority for the various aspects of the plan is found in the enabling legislation for Padre Island National Seashore (Public Law 87-712 September, 1962) in Administrative Policies for recreation areas of the National Park System, and the National Park Service Activity Standards.

## Management Category

Recreation Area

## Objectives

### To Serve the Visitor

Provide increased opportunities for those types and levels of outdoor recreational use that will be compatible with, dependent upon, or enhanced by the seashore environment, and leave to others the opportunity to provide facilities and development for other recreational and tourist activities.

Reach the visitor through various information and interpretive methods that will broaden his understanding of this barrier dune island: the processes by which it was created, the factors that continue to affect it, the human history associated with it, and, importantly, the means by which it can best be utilized for recreational benefit without impairment.

Coordinate with others in encouraging increased use of the seashore resources for environmental education purposes through the Environmental Study Areas and National Environmental Education Development Programs.

### To Preserve the Resources

Develop a sound resource management plan based on adequate research and aimed at eliminating the adverse influences of man, restoring natural

conditions, and otherwise enhancing recreational use through active resource manipulation.

Confine public vehicular use to established roadways and designated beach corridors in order to preserve fragile dunes and grasslands. A suitable means should be developed for visitors to gain access to those sections of the seashore not accessible by conventional motor vehicles.

Seek legislation adjusting the boundaries south of Mansfield Channel to the minimum needed for development of essential visitor-use facilities on the south end of the National Seashore.

Continue to work with the oil and gas-extraction industries in developing means that will minimize any adverse environmental effects of this legislatively authorized resource use.

Continue to manage wildlife resources in close cooperation with the State of Texas, the National Audubon Society and Federal agencies pursuant to existing memorandums of understanding.

Work closely with the Corps of Engineers in developing ways to minimize any adverse environmental effects of their channel-dredging operations.

To Administer the Area

Operate the National Seashore year-round. Administration will be through two district offices, one at each end of the seashore, with administrative headquarters located in Corpus Christi.

# general development

padre island national seashore

## II. LAND CLASSIFICATION

Class I. -- High Density Recreation

Class II. -- General Outdoor Recreation

Class III. -- Natural Environment Areas

Class IV. -- Outstanding Natural Areas

Class V. -- Primitive and Wilderness Areas

Class VI. -- Historical Areas

class IV
class VI
big shell beach
little shell beach
class I
class II
class III
class IV
class V
class VI
shipwrecks underwater within the boundary are class VI
north
0 1 2 3 4 5 miles
mansfield cut – class I
boundary to be changed - meanwhile class II
land classification
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## III. ANNOTATED MANAGEMENT CONSTRAINTS

A. Legislative Constraints (See documents in Appendix A, "Constraint Documents.")

1. Public Law 87-712, 87th Congress, S.4, September 28, 1962 - The Establishment Act for Padre Island National Seashore.

   (a) When acquiring land, waters, or interests therein, the Secretary of Interior shall permit a reservation by the grantor of all or any part of the oil and gas minerals in such land or waters. . .with the right of occupation and use of so much of the surface as may be required for all purposes reasonably incident to the mining. . . .

   (b) Land acquired shall exclude and shall not diminish any right of occupation or use existing on April 11, 1961, which are reasonably necessary for the exploration, development. . .of oil and gas minerals.

   (c) The Secretary may grant additional rights of occupation or use of the surface for the purposes aforesaid (oil and gas operations) upon the terms and under such regulations as may be prescribed by him.

2. Senate Bill 6, Acts of 1963, of the 58th Legislature of the State of Texas. The Act by which the State conveyed to the United States all the right, title, and interest of the State in the <u>surface</u> estate in the land in the National Seashore.

   (a) State reserves the right of concurrent jurisdiction, both civil and criminal.

   (b) The entire mineral interest in the lands is reserved to the State of Texas, together with the right of occupation and use of so much of the surface of the lands and waters as may be required for the mining, development. . . of the minerals. . . .

B. Memorandum of Understanding (Copies in Appendix A, "Constraint Documents.")

1. Memorandum of Understanding Between the Department of the Interior and the National Audubon Society Relating to the Administration of Bird Sanctuaries near Padre Island, Texas (1964)

   Concerns the administration of North and South Bird Islands which are within the boundaries of the National Seashore. Prior to the establishment of the National Seashore, those

islands were leased by the Audubon Society from the State of Texas for the purpose of propagating, protecting, and conserving birdlife. Under the terms of the Memorandum, the Interior Department assumed responsibility for administering and protecting North Bird Island, and the Audubon Society continues to administer South Bird Island.

2. Master Memorandum of Understanding Concerning Wildlife Resources in National Recreation Areas (Between the Texas Parks and Wildlife Department and the National Park Service) (1968)

   Outlines the responsibilities of each agency and their mutual responsibilities toward promoting and providing maximum recreation, hunting, and fishing benefits for the best interests of the people of Texas and the United States within Amistad Recreation Area, Padre Island National Seashore, and Lake Meredith Recreation Area.

3. Aquatic and Waterfowl Resources Management Plan for Padre Island National Seashore - 1969-1979

   This plan is mutually agreed to by the Texas Parks and Wildlife Department and the National Park Service.

   The plan pertains primarily to that portion of the Laguna Madre which is within the boundaries of the National Seashore. It concerns the management of the fishery, waterfowl, and recreational uses of the Laguna Madre (and to all of the Seashore to some extent).

C. Spoil Disposal and Right-of-Way Easements

1. Spoil Disposal and Right-of-Way Easement Deed for the Gulf Intracoastal Waterway (1947) (See Appendix A, "Constraint Documents.")

   This deed involves the Arroyo Colorado Navigation District and the Corps of Engineers, United States Army.

   The Arroyo Colorado Navigation District granted the Corps of Engineers the perpetual right and easement to a 900-foot (274 m) wide strip of land from Corpus Christi, Texas, to the Mexican Border for the purpose of constructing the Gulf Intracoastal Waterway.

   The Corps of Engineers was also granted a strip of land, 5,000 feet (1524 m) wide, parallel and contiguous to the eastern boundary line of the 900-foot (274 m) wide strip of land mentioned above. It is to be used for the deposit of dredge material and other purposes in connection with the Gulf intracoastal Waterway.

Part of the 900-foot (274 m) wide strip of land and all of the 5000-foot (1524 m) strip are within the boundaries of the National Seashore in the Laguna Madre from approximately Marker 41-A to Marker 95, a distance of about 15 miles (24 km).

2. Easements for the Mansfield Channel and spoil levee easements and spoil disposal area easements in connection with the Mansfield Channel (April 1960).

   The Willacy County Navigation District (Raymondville, Texas) granted easements for the construction of the Mansfield Channel (and the necessary spoil levee and spoil disposal easements) to the United States of America (the Corps of Engineers, United States Army). (The south spoil levee easement also includes land for a causeway right-of-way.)

   From the centerline of the Mansfield Channel, the easements extend about 2,700 feet (823 m) to the north and about 1,050 feet (320 m) to the south.

   The north easement is within the National Seashore boundary from the beach west to the western boundary line.

   Presently, only a small portion of the south easement is within the National Seashore boundary, but this would be modified by the proposed boundary change.

D. Surface Leases for Oil and Gas Production (See sample lease in Appendix A, "Constraint Documents.")

   1. Sun Oil Company from Albert R. Jones, et al. Two surface leases recorded in Kenedy County Oil and Gas Records, Volume 6, pages 512-516.

      (a) Two-acre (0.8 ha) tract at Yarborough Pass for the purpose of erecting, maintaining, and using storage, loading, and operating facilities. Lease is for 30 years and was entered into on January 22, 1953.

      (b) Ten-acre (4 ha) tract at Yarborough Pass for the purpose of erecting, maintaining and using tanks, separators, and operating facilities and housing for not more than ten adult residents. Lease is for 30 years and is dated January 22, 1953.

   2. Sun Oil Company from Albert R. Jones, et al. Recorded in the Deed Records of Kleberg County, Texas, Volume 105, page 575. Dated September 30, 1954, and extending to September 30, 1984, and with renewal privileges.

A tract of 10 acres (4 ha) for the purpose of directional drilling into the Gulf of Mexico, and with the right to install wellhead connections, erect, maintain, and use tanks, separators, and operating facilities. (NOTE: This area is locally known as the "Twin Tanks" location.)

3. Standard Oil Company of Texas (Chevron Oil Company) from Albert R. Jones, et al. Dated May 25, 1955, and ending on February 21, 1984. Recorded in the Kleberg County Courthouse in the Deed Records, Volume 109, page 605.

   A two-acre (.8 ha) tract for the purpose of directional drilling into the Gulf of Mexico. (This tract is just to the northeast of the Chevron Separation Plant.)

4. Standard Oil Company of Texas (Chevron Oil Co.) from Albert R. Jones, et al. Dated February 22, 1954; lease can be extended at five-year periods. Recorded in Volume 109, page 9, of the Deed Records of Kleberg County, Texas.

   Five tracts of land, each being two acres (.8 ha) in size. Tracts are designated by the letters "S" through "F" (excludes "E"). These sites are to be used for directional drilling from the Island into the Gulf of Mexico.

   These tracts are located north and south of the Chevron Separation Plant and are on the beach side of the foredunes.

5. Standard Oil Company of Texas (Chevron Oil Co.) from Albert R. Jones, et al. Dated August 11, 1955, and ending on February 21, 1984. Recorded in Volume 112, page 491, of the Deed Records of Kleberg County, Texas.

   A two-acre (.8 ha) tract for the purpose of directional drilling into the Gulf of Mexico from Padre Island.

6. Standard Oil Company of Texas from Albert R. Jones, et al. Dated February 22, 1954, and ending on February 22, 1984. (The page and volume of the Deed Records are unavailable.)

   A tract of 100 acres (40 ha) for the purpose of erecting, maintaining and using tanks, separators, warehouses, supplies, and other operating facilities and housing for not more than ten adult residents (and minor children of said residents).

7. Cactus Petroleum,Inc. (now held by the Permian Corporation). Lease and other information are not available, but the surface lease of two-acres (.8 ha) is mentioned in the pipeline and road right-of-ways which were issued to Cactus Petroleum, Inc.

A two-acre (.8 ha) surface lease on the shore of the Laguna Madre west-northwest of the Chevron Plant. The 30,000 barrel tank which previously occupied the site was removed in September of 1973 and the connecting pipeline filled with water and plugged.

E. Pipeline Rights-of-Way (See sample right-of-way in Appendix A, "Constraints Documents.")

1. Sun Oil Company-pipeline right-of-way from Albert R. Jones, et al. (NOTE: This right-of-way was assigned to Florida Gas Transmission Company.) The right-of-way is two rods (10 m) wide and the length is 92,931 feet (28,325 m). Pipeline begins at Yarborough Pass and goes north. Dated January 1953. Pipeline to transport oil or gas. Recorded in Deed Records in Kleberg County Courthouse in Volume 102, page 139.

2. Sun Oil Company-pipeline right-of-way from same people mentioned in above #1. Right-of-way for eight pipelines in the Yarborough Pass vicinity. Pipeline for transporting oil and gas. Dated February 3, 1954. Recorded in Deed Records in Kleberg County Courthouse, Volume 105, page 153.

3. Cactus Petroleum, Inc. (now held by Permian Corporation). Pipeline right-of-way and a shell road right-of-way from Rev. Charles Taylor, Dr. P. G. Lovenskiold, Mr. Charles L. Rankin, Mrs. Alice R. Dinn, Mrs. Anita L. Jolly, and Mrs. Katherine Holotik. Pipeline right-of-way is 25 feet (7 m), and road right-of-way is 10 feet (3 m). Pipeline and road go from the Chevron Oil Company plant to the 30,000 barrel tank on the west shore of the Island in the National Seashore. Pipeline to transport oil. Dated August 8, 1958. Recorded in Kleberg County Courthouse in Deed Records, Volume 148, page 558.

4. Same as #2 above - for another pipeline in the same area. Dated July 28, 1958. Recorded in Kleberg County Courthouse Deed Records, Volume 148, page 555.

5. Texas Eastern Transmission Corporation-pipeline right-of-way from the Chevron Oil Company separation plant in the northern part of the National Seashore. Pipeline runs northwest across the Island and enters the Laguna Madre near the South Bird Island. Right-of-way given by essentially the same people as in #3 above. Pipeline carries natural gas. Right-of-way is 50 feet (15 m) in width in some places and 200 feet (61 m) in others. Recorded in Nueces County, Texas, R/W No. C-1 and C-2A, W. O. No. 4523, Chk. 37891.

F. Oil, Gas, and Mineral Leases (Sample lease in Appendix A, "Constraint Documents.")

1. Sun Oil Company from P. F. Dunn and the McCampbells. Dated August 24, 1936; the primary term is 20 years, and as long thereafter as oil, gas or other minerals are produced. Recorded in Volume 2, pages 109-118, of the Oil and Gas Records of Kenedy County. The lease contains 56,860 acres (23,011 ha), most of which is in the National Seashore.

   This lease gives Sun Oil Company the mineral lease to the Northern Division of Padre Island -- from the "Corral" Triangulation Station northward to the Kleberg-Nueces County Line. The "Corral" Triangulation Station is located near Coyote Lake.

   (a) Sun Oil Company from P. F. Dunn and the McCampbells. Dated August 24, 1936; the primary term is 20 years, and the lease remains in effect as long as oil and gas are produced. Recorded in Volume 43, page 218, of the Deed Records of Kleberg County, Texas.

   This is the same area as described above; the lease is recorded in the other county involved - Kleberg.

2. Oil and Gas Leases in the Southern Division (below the "Corral" Triangulation Station).

   The mineral rights in this area of the National Seashore are all privately owned. No oil or gas has been discovered. The mineral leases change frequently, and sometimes one oil company assigns its rights to another oil company.

   The following oil companies have had leases within the National Seashore below the "Corral" Triangulation Station:

   (a) Orion Oil Company from Wayne V. Jones, et al, and Coleman McCampbell, et al. Contains about 24,000 acres (9,713 ha) and extends from near the wreck of the Nicaragua north to the U. S. Coast and Geodetic Survey Station "Swim." Lease date is June 1, 1962. Lease was for five years, nine months, and as long thereafter as oil and gas is produced (there is no production). NOTE: On June 20, 1962, Orion Oil Company assigned this lease to Sinclair Oil Company.

   (b) Superior Oil Company from Gilbert Kerlin. 15,000 acres (6070 ha) in Willacy and Kenedy Counties. Some of this lease falls within the seashore boundary. This 15,000 acre (6070 ha) lease joins the Gulf Oil Corporation lease mentioned in (c) below and extends north.

(c) Gulf Oil Corporation from Gilbert Kerlin, 5,000 acres (2023 ha) of land. Some of this lease falls within the Seashore boundary. The southern extent of this 5,000 acre (2023 ha) lease is the Cameron-Willacy County Line. If the Seashore boundary is changed, none of this lease will be within the Seashore.

(d) Union Oil Company of California from Wayne V. Jones, et al. 10,423 acres (4218 ha) beginning three miles (5 km) south of "Corral" Triangulation Station and extending south for about ten miles (16 km). Lease date is June 10, 1970. The lease is for a term ending June 10, 1975, and as long thereafter as oil, gas or liquid hydrocarbons are produced.

## IV. NATURAL RESOURCE MANAGEMENT PROGRAM

Actiona included in the project discussions will be divided into four types and designated in each action statement. The four types of actions are:

I. Those Actions Whose Implementation Will Have A Significant and Measurable Effect on the Environment or Are Highly Controversial

II. Those Actions Which Will Continue Existing Maintenance

III. Those Actions Which Will Initiate New Maintenance

IV. Those Actions Which Entail Research

## RESOURCE MANAGEMENT SITUATION

The basic problem at Padre Island National Seashore is the absence of a good inventory of the natural resources. It is rather difficult to manage something about which little or nothing is known. Therefore, the first priority is to get complete inventories of the natural resources.

Secondly, little is known about the island prior to the arrival of the Spanish who began to raise cattle and thereby changed the resources. Research is necessary to establish which plants and animals were on the island before that time. Then decisions will have to be made concerning the feasibility and desirability of returning the area to a more natural condition.

As an example, it is not known whether an oak forest or stands of oaks stretched the entire length or only the northern third of the island. There are live oaks on the north end of the island (including several small groups in the National Seashore in the vicinity of the Permian Tank). There is also evidence of a "stump forest" west of the Twin Tanks which has occasionally been seen when the sand dunes shift. But it is not known whether the oaks extended further south. This information is important because it would help determine whether deer, javelina, turkeys, and other animals ranged the entire island or only the northern end of the island.

# resources

padre island national seashore

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Current (1973) Natural Science RSP-WRP Research Program

| Number | Project Title | Status |
|---|---|---|
| RSP | | |
| N-1 | Historical Survey of Plant and Animal Populations | No Action |
| N-2 | Padre Island Biological Survey | Underway |
| N-4 | Spoil Island Utilization by Nesting Birds | No Action |
| N-5 | Shallow Pond Ecology | No Action |
| N-6 | Ecological Research | No Action |
| N-100 | Park Natural Sciences Research Plan | Resource Management Plan Fills This Need. |
| None | Developing Techniques for Building and Stabilizing Sand Dunes | Underway |
| None | Secondary Succession of Vegetation | Underway |
| None | Effects of Human Activity on the Ecology of the Sand Dunes | Underway |
| None | A Study of Beach Elevation and Vegetational Interrelationships on Padre Island, Texas | Underway |
| None | A Tide and Circulation Study of Upper Laguna Madre | Underway |
| WRP | | |
| PAIS-1 | Water Quality Study of the Laguna Madre | Pending |

1. Project: Completion of Natural REsources Basic Inventory

An inventory of natural resources is fundamental to planning for wise resource management. While much information has been assembled, the inventory is not yet complete. A portion of this inventory will be available when the on-going biological survey of Padre Island is complete. That study is concerned with the inventory and zoogeographic analysis of the area's birds, terrestrial vertebrates, marine vertebrates and mollusks, and plants. Cooperative agreements with organizations such as universities and the Welder Wildlife Foundation can aid basic data accumulation.

Action (Research)

Initiate research and studies of the following natural resources, and encourage the completion of the work being undertaken by the biological survey.

Research

Projects must be formulated to provide:

A. A species list of all known fungi and bacteria in the park area.

B. A species list of all invertebrates (other than mollusks) denoting those species that are considered rare and/or endangered or of high visitor or scientific interest.

C. An inventory of all significant geologic features and processes.

D. An inventory and distribution map of major soils found within the area.

E. An inventory of all lakes, ponds, shoreline, groundwater, and other water resources of the area.

2. Project: Climate Variations

Basic natural resources data are needed for formulation of sound management planning and decisions, to fulfill interpretive needs, and to comply with Natural Science Studies Activity Standards.

The National Seashore extends for about 70 miles (112 km) from north to south. The climatic variations in this distance are poorly known but may help explain geographic variations in flora and fauna. This information may also aid management practices of dune stabilization by determining the most appropriate plant species and the best times of the year for planting.

Action (Research)

Establish three weather stations south of Malaquite Beach; suggested locations are: (1) Yarborough Pass, (2) south entrance to the back road, and (3) near the Mansfield Channel. Until more personnel are available, it will be difficult to operate complete weather stations; however, rain gauges will soon be installed at these locations and other instruments will be installed when possible.

Considerable research has already been completed for the Gulf Coast on climate and dynamic coastal processes. These data will be accumulated in the preparation of the Resource Basic Inventory and utilized in area management and interpretation.

Research

To be accomplished by park staff.

3. Project: Water Resources Analysis of Padre Island

A thorough analysis of all fresh ground and surface water supplies of the island is necessary prior to sound management and decision making and to comply with requirements of the basic natural resources needs for a Basic Ecosystem Survey, NEPA-1969 and Water Quality Acts.

The many freshwater ponds and shallow ground water supplies in the northern section of the National Seashore and in the vicinity of Little Shell Beach are subject to pollution and environmental change. Some of these ponds are near roads or are accessible by road; as a result, they are subject to pollution from various human activities. Ponds in other areas also may be subject to pollution in the future.

Oil and gas production in this area pose a threat of pollution. Commercial and residential development is occurring north of the National Seashore and is expected to increase. One developer is using sewage effluent to water a golf course. As additional developments are built, the chances for pollution of the underground freshwater lens will increase, particularly if zoning ordinances permit septic tanks, etc.

Padre Island (including the area now in the National Seashore) has been used by recreationists (including campers) for many years. Except for a few locations, there are no toilet facilities. The discharge of human wastes on the land is a sanitation problem in itself and may also contaminate the freshwater ponds and the underground water supply.

The National Seashore and other nearby Gulf coastal areas are the southern terminus of the Central Flyway. Many species of waterfowl and game birds rest and feed here in the winter time. These ponds provide necessary habitat areas for these birds. Any damage or pollution of these ponds will create an impact on the various populations of the water birds.

Action (Research)

Initiate research and continue to monitor the water quality of the ponds and the waterfowl populations throughout the year. Records will be kept to determine populations and species trends. Certain ponds, with carefully constructed nature trails, will be set aside as interpretive areas to inform visitors of the valuable resources present in these unique water areas. Pond ecology will continue to be an interpretive theme.

Seek the cooperation and support of the Environmental Protection Agency and the Texas Water Quality Board in monitoring the water quality and in controlling sources of pollution.

Research

Studies should be directed toward two goals: (1) determine the water quality and effects of activities outside the park upon the quality of water within

the park, and (2) ascertain the recharge area for the park and determine actions necessary to preserve the system.

This study should include a complete inventory and analysis of the ponds and other water sources on the island, potability, the functions of the fresh water in the ecosystem (runoff amounts, use by and importance to the basic faunal system, etc.), the threats from potential water deficiencies, pollution of water, etc.

4. Project: Vegetative Cover and Effects of Grazing

In July 1971, after 150 years, the grazing of cattle on Padre Island National Seashore was terminated. What will be the effects on the types and amounts of vegetative cover following the termination of grazing? These types of data are necessary for the development of correct management programs (including the possibility of reestablishment of species) and interpretation.

Action (Research)

Continue to assist and encourage research by personnel from Texas A&I University of Kingsville, Texas, on a long-range project to determine secondary successional trends. Initiate additional research that will provide information on vegetative cover of the island as it existed prior to the introduction of cattle. This study should include the analysis of an area where winds uncovered sections of broken stumps and roots of an apparent stand of Virginia live oaks.

It may also be necessary to replant oaks and to reestablish other native plants, if the research reveals clear evidence of the oak cover and concise data that will allow the development of a pre-Colombian floral composition index for Padre Island.

Research

Current research involves: (1) Establishment of 10 permanent 100 linear-foot (30.5 m) transects in each of the five vegetative types present on the island. Four times per year the amount of basal area covered by each species along the transects will be recorded. Over a period of time (10-20 years) changes in species composition should become apparent. (2) Determine the effects of burning and shredding on the vegetative cover and yield within the low coastal sands. (3) Compile a complete herbarium collection of the study area (three mountings of each plant) with a complete set for the National Park Service.

Additional research should determine appropriate vegetative productivity, stand composition, succession, biomass, water and nutrient needs, and other ecological parameters and should establish benchmarks for a monitoring system to provide a warning of future vegetative changes. If oak stands are reestablished, these trees should be monitored for vigor and disease.

Fig. 2. SECONDARY SUCCESSION TAKES OVER OLD NOVILLO LINE CAMP AFTER THE END OF 150 YEARS OF GRAZING. PAIS Photo.

5. Project: Faunal Factors on the Island

Considerable data must be obtained if the National Seashore's wildlife is to be managed in the most effective method and to comply with Service mandates and Natural Science Studies Activity Standards.

Action (Research)

Initiate research, continue documentation of out-of-the-ordinary faunal sightings. Continue cooperative activities with State and Federal wildlife management agencies, to encourage them to supply the Park Service with suitable information upon request.

Research

A faunal study should include data gathering and analysis of distribution and abundance of animal species, population dynamics, migration, and immigration. This study is a prerequisite to Project 12, Completion of Resource Analysis.

6. Project: Exotic Wildlife

The King Ranch is on the mainland opposite Padre Island National Seashore. The ranch is stocked with several species of exotic wildlife, and some of these animals have crossed over to the island. The most recent species to be seen is the Nilgai (an antelope native to India).

Animals are able to go between the Island and the Mainland primarily in the vicinity of the "Land Cut." This is an area in Kenedy County where the Laguna Madre is quite shallow, and during the summer months the water level drops to such an extent that the area becomes dry. If it were not for the Intracoastal Canal which has been dredged through this area, the crossing could be made without getting wet. Since the Canal is only about 50 yards (46 m) wide, the crossing is still not too difficult.

Action (Continue Maintenance)

Meet with the King Ranch wildlife managers and find out which species of wildlife are present on the ranch and which ones are likely to enter the National Seashore.

Develop specific plans to deal with the various species which come to the Seashore. Perhaps some animals can be trapped or tranquilized and returned to the ranch. Others may have to be destroyed so they do not increase and cause environmental problems or pose a safety hazard for visitors.

Research

None required.

7. Project: The Role of Wildfire

Considerable data is necessary if fire is to be used as a management tool. There is some question as to whether lightning-caused fires occur on Padre Island. There have been none in recent years, and it is not known whether lightning caused fires years ago when there were trees on the island. However, it is known that many man-caused fires do occur, both accidentally and intentionally. Prior to the establishment of the National Seashore, the ranchers repeatedly burned large sections of the area to "green up" the vegetation. A study done in 1966 and 1967 by the Soil Conservation Service at the request of the National Park Service states, "The long time effect of burning has been almost disastrous" (in regard to the vegetation).

Following the establishment of the National Seashore, the National Park Service prohibited the ranchers from burning the grass. Grazing of cattle in the National Seashore was terminated in 1971, so fires in connection with grazing are no longer a problem.

A few other man-caused fires (mostly from campfires) have occurred since the Seashore was established. Most have been small, but a 700-acre (283 ha) fire burned in the Big Shell Beach area in January 1970.

As a result of the termination of grazing and the burning associated with it, there is much more grass (fuel) now. The vegetation should progress to a climax; although it is not known what the climax vegetation will be, grasses will make up much of the vegetation.

Action (Research)

Initiate research in conjunction with Project 4, Vegetative Cover and Effects of Grazing, and develop a wildfire management plan as an interim program. Letting fires burn haphazardly is unacceptable in view of the oil pumping and drilling facilities.

Research

This study should develop as an expanded vegetative cover project currently underway through the University of Texas and Texas A&I, and will be devoted to vegetative and wildlife management.

A fire study should be correlated with a climatic study and include the following:

For each ecosystem under consideration --

Under what conditions of climate, slope, fuel, time of year, etc., do fires usually occur?

Are periodic fires a normal part of the ecosystem, i.e., are they required for the maintenance of that ecosystem or for a particular vegetative type within the ecosystem?

If so, what is the periodicity of such fires?

What special adaptations are present in such an ecosystem?

In a fire adapted ecosystem, can there be too much fire?

What is the fire behavior -- crown, surface, etc. -- in the ecosystem?

Can wildfire smoke, heat, etc. damage neighboring plant communities?

If so, do the benefits outweigh the disadvantages?

What are the economic considerations of fighting and of not fighting natural fires?

8. Project: Peregrine Falcon

The National Seashore provides a corridor through which peregrine falcons fly on migration routes in the autumn and spring. This bird, always subject to trapping and sale to a lucrative market of falconers, has recently been put on the list of endangered migratory birds, and great care must be exercised to give it all possible protection during migration.

Action (Continue Maintenance)

Continue the frequent patrol of the beaches to observe the falcons, to prevent poaching, and to apprehend poachers. Cooperation should be continued with the Bureau of Sport Fisheries and Wildlife and Texas Parks and Wildlife Department concerning regulations, controls, and status of this endangered species. A yearly census should be carried out with other agencies and individuals seeking to understand the population status of the bird. Lines of agreement and cooperation should be established between the State of Texas, the Fish and Wildlife Service, and the National Park Service in any future collection permits and in regulations pertaining to this bird. These three agencies must keep each other informed of any actual or suspected trapping of the falcons.

Fig. 3. RARE PEREGRINE FALCON SITTING ON POND SNAG NEAR SOUTH BEACH DUNES.
PAIS Photo.

9. Project: Atlantic Ridley Turtle Reestablishment

Padre Island was once a major nesting site of the Atlantic Ridley turtle. Accounts from old-time residents relate how they traveled by wagons along the beach and had to wait while turtles traveled from their nests to the water. This species is no longer known to nest within the United States. It does nest on the coast of Mexico where it is protected, but eggs are quickly collected and sold when authorities are absent.

The species may be endangered and should be considered for reintroduction onto Padre Island which may be its only protected nesting site.

Action (Research)

Initiate research, and proceed with actions deemed conducive to the reintroduction of the species. First, vehicles must be restricted from a section of beach; vehicles should not be permitted to drive over the nests and destroy the eggs. At the present time, there is no feasible section. However, the Master Plan proposes closing Little Shell Beach to vehicular traffic, and this beach could be used as a nesting area. Investigate the desirability of a cooperative agreement with Mexico for the collection and transportation of turtle eggs. Establish liaison with other agencies and individuals who have shown interest in the population dynamics of the Ridley turtle. Encourage the use of Padre Island as a natural laboratory.

Research

This study could best be undertaken by a Park Service biologist; investigations should be initiated soon if this species is to be saved from extirpation. Research activities should include: (1) comparative habitat evaluation, (2) feasibility of collection of turtle eggs from Mexican beaches and introduction on a protected beach of Padre Island National Seashore, and (3) a monitoring program.

10. Project: Impact on Beaches and Dunes

Vehicular traffic and visitor activities have caused considerable erosion and vegetative damage to dunes and beaches in the National Seashore. Vehicular traffic has been prohibited from a five-mile (8 km) portion on the beach since April 1969. The vegetative line on this five-mile (8 km) section of beach is 70 feet (21 m) further seaward than in sections of beaches accessible to vehicles.

Vehicular traffic has obviously prevented the growth of vegetation on the beach, negating the stabilization of the smaller foredunes. The absence of these small dunes makes the primary foredunes more likely to erode during high tides. This process, if allowed to run its course, could eventually destroy the foredunes.

It became apparent during the fall rainy season in 1973 that there may be serious problems on the South Beach. Following heavy rains, the fresh-water ponds on the interior of the island broke through the dune line and the water ran into the Gulf of Mexico. In so doing, the water cut deep channels in the beach making beach travel hazardous.

The Master Plan proposes the closing of Little Shell Beach to vehicular traffic which will be an addition to the total area of beach on which vehicular travel is prohibited. The purpose of this plan is twofold: to allow revegetation of dunes after many years of grazing and to provide a beach in a relatively natural condition for shelling and other recreational Park pursuits without the intrusion of motor vehicles.

The higher vegetated dunes are being eroded by visitor activities, especially children climbing, walking, and sliding down the dunes. The ever-present wind erodes the non-vegetated sections of the dunes, and thus facilitates their breakdown. The foredunes at the campground and North and South Beaches are showing the most erosion.

Not only do the vegetated dunes provide excellent protection for the rest of the island and mainland from storm tides, but vegetated dunes are scenic, provide good habitat for animals, and must be maintained to comply with Congressional mandates.

Action (Research)

Continue to support research activities underway through agreement with the University of Texas and cooperative institutions. Other park action will include:

A. Stabilize dunes which obviously have been eroded by visitor activities. Some methods of stabilizing dunes include sprigging, seeding, mulching, fertilizing, and watering. These techniques have been under study by the U. S. Corps of Engineers and the Gulf Universities Research Consortium from 1968 to 1973. With the use of these data, manage the

dunes in the most logical manner. It may be necessary for management to hire a consultant.

Stabilization of dunes may include the fencing of some dunes to keep visitors off and the erection of signs to explain the purpose of stabilization and the methods, and to ask for visitor support in the endeavor.

B. Study the possibility of building wooden walks and steps to the top of the most suitable dunes for the purpose of observation and aesthetic stability. As long as the walkway itself does not cause erosion, steps should eliminate the erosion.

C. Continue (and expand) visitor contacts, explain the importance of the foredunes and solicit visitor cooperation in protection of the resources.

Research

The first portion of this study is underway by personnel of Texas A&I University, and continual funding will be programmed through the University of Texas Marine Science Institute. The total study will address itself to the following problems:

A. Determine effects of human activity on the ecology of the sand dunes. Establish a carrying capacity for the National Seashore. This should be derived through determinations of: (1) the total productivity of vegetation in four predetermined transects during seasonal fluctuations as related to human impact; (2) plant species composition in the four transects during seasonal fluctuations; (3) animal species composition on a monthly basis; (4) vigor measurements of various grass species that may be more durable to human traffic and thus of greater benefit to dune stabilization in areas of considerable human activity; and (5) study micro-environments within the study area and the modifications human activity creates.

The above phase of the study may address itself to park action of fencing of some dunes to help determine dune stability and the time required for the dunes to become stabilized through various rehabilitation projects. This project should help determine the feasibility of "rotating" sections of foredunes for visitors use.

B. Determine effects of vehicular traffic on the beach and adjacent environments. What ways have vehicular travel effected the biology of the beach, foredunes, and adjacent waters of the Gulf? Have the fishing, bird life, and plants and other animals been affected? What level of travel results in a "tolerable" level of change? It is important that these and related questions be formulated and answered. This information will no doubt have application on other beaches.

C. Establish a monitoring program of dune stabilization and movement. Data should be acquired through fixation of markers, photographs of dunes for comparisons, and utilization of photoimagery. This phase of the study should coincide with Project 11, Dune Movement and Sand Accretion.

Fig. 4. SOUTH BEACH TENT CAMPING AREA IN EARLY SPRING IS SCENE OF HEAVY WIND EROSION. PAIS Photo.

11. Project: Dune Movement and Sand Accretion

The blowing winds of Padre Island are a significant force in movement of dunes. Because the beaches and dunes are important resources of the National Seashore, it is important to monitor their movement and influences upon adjacent environments. Blowing sands along the western shore are increasing the landmass and reducing the aquatic habitat. The critical area extends from the north boundary to the Permian Tank. The shallow vegetated flats adjacent to this shoreline are extensively used as and are extremely valuable as spawning grounds or nursery areas for speckled trout, red fish, black drum, sheepshead, pinfish, shrimp, and blue crabs and are a choice wintering area for migratory waterfowl.

Measured advance of the shoreline in some locations exceeds ¼ mile (400 m) in the past 20 years. A vast expanse of what was once the Laguna Madre is now emergent land and extends from the Island shoreline to the mainland in the "Land Cut" area. This island "drift" is a natural process, although man's interference has resulted in some acceleration. The dynamics of the Padre Island ecosystem must be protected, and unnatural activities must be controlled.

Action (Research)

Encourage the continuation of research activities on the techniques for building and stabilizing sand dunes by the U. S. Corps of Engineers and the Gulf Universities Research Consortium within the National Seashore.

Encourage additional plantings of grasses, and begin program of dune stabilization on the island. This action may include prohibition of some visitor activities, such as dune buggy driving, within the western area. Closing the dunes entirely to visitor use would require too much personnel. Research to determine the effects of tropical storms will be of great value.

Research

Obtain and coordinate existing remote sensing data pertaining to Padre Island and, with assistance from other agencies, utilize these data for management purposes.

Fig. 5. RELICT OF LIVE OAK FOREST. DUNE FIELD IN BACKGROUND IS SLOWLY MOVING INTO LAGUNA MADRE. PAIS Photo.

12. Project: Completion of Resource Analysis

To meet the final requirement of the Activity Standards, an analysis of the following resources and conditions must be programmed, initiated or completed--with completion being the ultimate goal. With the information provided by completion of action on Project 10, this analysis will form a firm basis for resource management.

Action (Research)

Initiate research and studies so that "operationally significant" factors in the park's biosystem can be identified and understood.

Research

This all-inclusive study involves all phases of the area's natural resources and is therefore a final step in a comprehensive analysis of the Padre Island ecosystem. This study must include the following (all other factors are addressed elsewhere):

> Measure the energy input and flowthrough in the system and the nutrient and mineral cycles of the ecosystem. Some portions of this project are included in Project 10.

13. Project: Harmful Materials Washing in on the Beaches

The beaches on Padre Island are well known for large accumulations of materials which wash ashore. These materials include driftwood, lumber, all sorts of trash, e.g., bottles, cans, TV sets, refrigerators, plastic sheeting, household garbage, and chemicals of various kinds, to name a few. Some of these materials are potentially harmful to visitors and to the resources. Of particular concern to the natural resources are the chemicals. In recent years, barrels and cans containing petroleum products, DDT, and acids have washed onto the beach. In addition, the beaches have periodically been covered with patches of oil or tar-like substances.

These chemicals are of great concern not only at the National Seashore but to communities along the entire Gulf Coast. They have the potential for causing damage throughout the Gulf of Mexico. They must be stopped from entering the Gulf, and this requires the cooperation of many agencies.

Action (Continue Maintenance)

A. Continue the daily patrolling of the beach to detect harmful materials.

B. Remove harmful substances from the beach.

C. Notify cooperating agencies, including the U. S. Coast Guard, Environmental Protection Agency, U. S. Fish & Wildlife Service, Texas Water Quality Board, Texas Parks & Wildlife Department, U. S. State Department, and local conservation organizations.

D. Obtain samples of the materials and submit them to the proper laboratories for identification.

E. Try to identify the responsible persons, companies, or agencies.

F. When possible, initiate court action to require the removal of the material and to prevent future pollution.

Fig. 6. BEACHCOMBING THROUGH TRASH AT BIG SHELL BEACH IS A POTENTIALLY DANGEROUS ATTRACTION TO SOME. PAIS Photo.

14. Project: Oil and Gas Exploration Activities on the Island

Legislation authorizing the National Seashore provided that when land was acquired, the oil, gas, and other minerals could be retained by the land owners and that the minerals could be mined and removed. The legislation also provided for the occupation and use of as much of the surface land and waters as may be required for all purposes reasonably incident to the mining of the minerals.

In addition, the legislation provided that leases, grants, and easements existing on April 11, 1961, for use of the surface for the exploration, development, production, storing, processing, or transporting of oil and gas minerals were to be honored.

As a result of the above, oil and gas production, storing, processing, transportation, etc., are continuing within the National Seashore.

For the most part, the National Park Service has received excellent cooperation from the various oil and gas companies. However, certain of their activities do cause slight damage to the land, and generally there is no alternative to the damage, except to prohibit the activity, which cannot be done. Activities in this category include: short access roads, the well drilling and production site, and pipeline spurs.

Occasionally, proposals are made which would cause much damage. In 1971, a pipeline company made a proposal to construct a 17-mile (27 km) pipeline through the Seashore. The line was to serve wells outside the Seashore but was to connect to another line inside the Seashore. The NPS opposed this proposal and the Department denied the application to do the work. In future years, proposals probably will be made by oil and gas companies which will have a significant impact on the environment. The NPS must remain alert to all the existing and future ramifications of the proposals and take the necessary actions and make the necessary decisions.

Action (Continue Maintenance)

A. The personnel at Padre Island must maintain good relationships with the various oil and gas companies. Try to instill in them a concern for the environment.

B. Thoroughly evaluate each new work proposal on a case-by-case basis. Try to minimize damage to the area as much as possible.

C. In cases where unacceptable damage will result, deny permission to do the work and suggest acceptable alternatives.

D. Issue Special Use Permits for work projects and include conditions which will protect the natural resources. Enforce the conditions of the permit during drilling or construction and insure that the affected surface area is maintained properly following construction and drilling.

Fig. 7. SUN OIL DRILLING SITE WITHIN SEASHORE BOUNDARIES.
PAIS Photo.

15. Project: Laguna Madre Oil and Gas Exploration Activities

The National Park Service holds title to the lands and waters of the Laguna Madre within its boundaries, but the mineral rights have been retained by the State of Texas. Leases on the various State Tracts are sold to oil and gas companies by the State for exploration and removal of these minerals. Standard recovery procedures involve the dredging of channels and basins from the Intracoastal Waterway to the drill site, the sinking of a drilling barge and, in cases of a successful hole, the erection of a permanent well protective structure at the wellhead after removal of the barge. The standard channel is 60 feet (18.3 m) wide dredged to a depth of six feet (1.83 m) below mean low water and the standard basin measures 190 by 308 feet (58 by 94 m) dredged to the same depth. The length of the channel varies with each bottom hole location. Because of the shallow water depths involved, each dredging operation results in large quantities of spoil material as well as the destruction of productive bottom habitat at the site.

A blanket permit is required by the U. S. Army Corps of Engineers for any operator planning work in the navigable waters of the United States and interested agencies and individuals are given the opportunity to comment upon these permit applications. The National Park Service coordinates its recommendations with those of the Texas Parks and Wildlife Department and the Bureau of Sport Fisheries and Wildlife on proposals within the National Seashore boundaries.

Action (Continue Maintenance)

A. Every effort will be made to encourage the establishment of directional drilling techniques as standard procedure in the waters of the Laguna Madre. Such procedures are technically feasible over the distances involved in most cases and can be accomplished from surface locations on Padre Island or existing spoil banks. Directional drilling involves added expense and is therefore considered economically unfeasible by operators. Oil and gas operators will need to be convinced that the lagoon habitat also has economic value.

B. Any new dredging necessary will be planned to result in a minimum of bottom area disturbance. The construction of toe levees on extant spoil banks or Padre Island itself and the deposition of fresh spoil behind these levees will be required.

C. In those State Tracts where channels and basins presently exist, future exploration operations should be restricted to directional drilling from these existing basins to reduce the need for further dredging operations.

D. Coordinate the effort to identify those State Tracts and recommend restrictions for each within the National Seashore boundaries with the State Land Office so that prospective bidders on leases will be made aware of Federal regulations affecting drilling operations.

16. Project: Spoil Bank Management

During construction of the Gulf Intracoastal Waterway through the Laguna Madre in 1948, dredged spoil material was placed along the edge of the channel at intervals creating emergent spoil "islands." Although these spoil banks became the property of the State of Texas, private individuals began building fishing shacks on the land without the permission of the State. The practice continues today outside the boundaries of the National Seashore. When the National Park Service acquired title to some 20,000 acres (8,100 ha) of the Laguna Madre from the State of Texas, further construction of these shacks was prohibited and those existing at that time were placed under Special Use permit. These permits will not be renewed, and the last permits expire in 1975.

With the eventual removal of existing spoil bank cabins, these spoil banks can be managed as a public resource. Many people who might like to utilize these sites for primitive camping are not aware that these are public sites because of the presence of private cabins. Some cabin owners are known to encourage this misconception by ordering visitors to leave "their islands." Some of the islands where no cabins exist or existing cabins are never used have become shore bird nesting sites. Unvegetated fresh spoil deposits are favored by nesting terns, gulls, and skimmers. Several such sites are now in use within the National Seashore.*

Action (Continue Maintenance)

A. Remove all traces of human occupation from spoil banks as soon as possible following the expiration of existing cabin permits.

B. Continue to protect those areas used by shore birds as nesting sites and maintain records of their location and use. Withhold any plans for development of these spoil banks until such time as some semblance of natural order has become established.

C. In the absence of additional deposits of fresh spoil material, maintain those existing in their present condition. Post these sites as nesting areas and prohibit public use.

D. Following the establishment of a pattern of use by shore birds and waterfowl, manage any remaining suitable spoil banks for public use and enjoyment. Such use should be limited to primitive camp sites; no permanent facilities should be provided.

*Problems created when spoil is deposited on spoil islands during the nesting season are discussed in Anatomy of a Spoil Island, by Diana Barnes, and Nesting and Development of the Reddish Egret, by Sharon McMurry. The two books are in the Seashore library.

E. Work with the Corps of Engineers so they will not authorize the dredging of the Intracoastal Waterway during nesting season. Deposition of fresh spoil on spoil banks being used by nesting birds would be disastrous to the bird population.

Fig. 8. SQUATTER'S CABIN ON SPOIL BANK NEAR BUOY NO. 91 DISSUADES CAMPERS. PAIS Photo.

17. Project: Corps of Engineers Spoil Disposal Easements

The U. S. Army Corps of Engineers has retained spoil disposal rights extending 5,450 feet (1661 m) east of the centerline of the Gulf Intracoastal Waterway. This area includes virtually all the Laguna Madre lying within the boundaries of the National Seashore. In practice, spoil disposal areas are presently limited to within 1,000 feet (305 m) of the Waterway's centerline. Additional maintenance dredging becomes necessary only infrequently and is accomplished by private contractors according to Corps of Engineers specifications.

Action (New Maintenance)

A Memorandum of Agreement or Understanding should be initiated between the Corps of Engineers and the National Park Service since the land is now under title to the United States of America and the constraint document (the spoil disposal right-of-way assignment deed) is no longer valid or applicable in its present state. At the time specifications are drawn, attempt to specify certain areas where spoil disposal will interfere least with the management of the resource. Within the Seashore, specify that toe levees be constructed on selected existing banks and any fresh spoil be deposited within the levee to prevent its return to the water. Specify that any materials or equipment used in the operation be removed from the area upon completion of the project.

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18. Project: Pollution Control in the Laguna Madre

Pollution is not generally considered to be a major problem in the Laguna Madre when compared with other bays and estuaries along the Texas Coast. It owes its relative freedom from pollution primarily to those factors which contribute toward its hypersalinity--restricted circulation and the absence of fresh water streams carrying pollutants to it. Mineral exploration is increasing and problems may develop through spills of oil, drilling muds and core cuttings. Accidents involving barges carrying petrochemicals on the Intracoastal Waterway pose another hazard. One oil storage facility is located within the Seashore. Agricultural pesticides from the Rio Grande Valley pose a major problem in the Lower Laguna Madre where DDT levels are high and where these pollutants empty into tributary inlets.

Action (Continue Maintenance)

Oil and gas exploration activities and oil storage facilities are the only sources of problems over which the Service has anything resembling direct control. During drilling operations the Service will insure that core cuttings, drilling muds, and all other waste materials are retained by the operator and removed from the area for disposal on dry land. The oil storage facilities will be regularly inspected and maintained in accordance with the requirements of the Texas Railroad Commission. Any uncorrected deficiencies will be brought to the attention of the Railroad Commission for appropriate action.

19. Project: Hypersalinity of Water in the Laguna Madre

The water of the Laguna Madre is normally hypersaline because of the restricted circulation and the absence of fresh water input. Prior to completion of the Gulf Intracoastal Waterway in 1948, open water salinity reached 114 ppt, and fish kills were common. The Waterway slightly improved the circulation of the Laguna. However, the landfill causeway (Kenedy Causeway), constructed in 1948, restricted water circulation over the shallow flats and accelerated siltation. This lack of circulation caused additional hypersalinity, resulting in additional fish kills. In recent years, channels have been dredged for various reasons (usually oil and gas well drilling). Sometimes, these channels have helped circulation; at other times the spoil from the channels restricted circulation.

The completion of the high bridge across the Intracoastal Waterway at the causeway will result in the removal of the existing swing bridge and may increase circulation. Channelization in the Padre Isles development on the north end of Padre Island may eventually provide additional water exchange between the Gulf and Laguna Madre. The State of Texas has shown an interest in an additional water exchange pass in the Boggy Slough area. The effect of any or all of these activities is presently unknown.

Action (Research)

Initiate research into the circulation of the Laguna Madre and other facets of the hypersalinity and pollution of Laguna Madre; maintain liaison with Federal and State agencies involved with research and management of the Laguna. Continue to encourage stricter regulation of channelization and spoil deposition.

Research

The Texas Parks and Wildlife Department carries on a continuous program of water quality monitoring which includes turbidity, water temperatures, salinity, and dissolved oxygen studies.

A. The University of Texas Marine Science Institute began research on the tide and circulation of Upper Laguna Madre in June 1973. The objectives of this phase of the study are: (1) to determine the volume of water moving into and out of the study area; (2) to determine the primary inflow and outflow channels; (3) to determine characteristic current speeds associated with wind drift and tidal motions; and (4) to determine the characteristics of the local tides (as differentiated between the wind tides and lunar tides).

Continued studies should include the following:

B. Effects of dredging upon the Laguna Madre and Padre Island ecosystems.

C. Consequences of opening accesses to bays within the National Seashore.

D. Projections of the effects of catastrophic storms on the ecosystem.

E. Monitoring of the Laguna Madre ecosystem.

20. Project: The Hole

The Hole is a body of water in the Land Cut section of Kenedy County. Located west of Big Shell Beach, it extends from about two miles (3.2 km) south of Yarborough Pass to the south end of Big Shell Beach, and lies between Padre Island and the Gulf Intracoastal Waterway. About half of it is in the National Seashore and the other half is State-owned.

During most of the year, the Hole is joined with the rest of the Laguna Madre at the north end. However, during the summer months, when the level of the Laguna Madre drops, the Hole becomes separated from the rest of the Laguna Madre--hence its name. As the summer progresses, evaporation lowers the water in the Hole until it cannot sustain fish life. As a result, there have been some large fish kills - in 1969, it was estimated that 900,000 pounds (408,600 kg) of fish died, including an estimated 550,000 pounds (250,000 kg) of redfish. In 1971, an estimated 760,000 pounds (345,000 kg) were killed including 710,000 pounds (322,000 kg) of mullet.

In July 1972, the U. S. Corps of Engineers dredged a channel into the Hole from the Intracoastal Waterway in an effort to alleviate the above condition.

In early 1973, the Texas Oil and Gas Corporation applied for permission to drill oil and/or gas wells in four tracts within the Hole. All or parts of all of the tracts are within the National Seashore. The National Park Service and Texas Parks and Wildlife Department were concerned that indiscriminate dredging and spoil deposition in the Hole associated with oil and gas exploration and production could destroy the drainage of water into the channel made by the Corps of Engineers. The National Park Service's views were made known to the U. S. Corps of Engineers through the Field Representative, U. S. Department of the Interior. To date, Texas Oil and Gas Corporation has not made application to drill wells at a specific location on one of the four tracts.

The Hole is a very productive body of water. It is far enough away from "civilization" that a quality fishing experience is still available. Actions affecting the Hole must be carefully evaluated to insure that it is not adversely affected by the proposed action.

Action (Continue Maintenance)

A. Periodically check the Hole for water level, proper channel drainage of the Hole, etc.

B. Evaluate the effects of the channel into the Hole, and in conjunction with the Texas Parks and Wildlife Department, make recommendations to the Corps of Engineers on the continued maintenance of the channel.

C. Thoroughly evaluate each proposal for oil and gas well drilling activities in the Hole. Make recommendations through the Special Assistant to the Secretary, U. S. Department of the Interior, to the Corps of Engineers, U. S. Army, regarding conditions which may result in environmental damage.

Research

None required.

21. Project: Fishery Management in the Laguna Madre

The National Park Service administers only a small portion (20,000 acres or 8,100 ha) of the total area of the Laguna Madre and must, therefore, assume a secondary, cooperative role with the State of Texas regarding fishery management. Most attempts to manage the fishery have been based upon sociological aspects rather than biological evidence. Legal net fishing has been eliminated and has been replaced by extensive top water trotlining or by illegal gill netting. Trotlining, if not actually detrimental to the fishery, is annoying to sport fishermen and presents hazardous obstructions to boat operators. The existing trotline fishery has caused varying degrees of mortality to waterfowl (including redhead ducks and pelicans) with losses being more acute in areas of heavy waterfowl use. Increasing population will place substantially heavier pressure on fishery resources. Recreational demands will probably result in additional restrictions on the commercial fishery industry.

Action (Continue Maintenance)

A. Continue to monitor the condition of the fishery in cooperation with biologists of the Texas Parks and Wildlife Department.

B. Through education, enlist the voluntary cooperation of commercial fishermen in keeping trotlines away from areas of heavy waterfowl use and areas favored by recreational boaters. Voluntary cooperation will be more effective than the establishment of additional regulations in this area and additional regulations should be considered only as a last resort.

C. Maintain a continuous program aimed at the prompt removal of abandoned and untagged trotlines and stakes within the Seashore boundary. Once those presently in existence are removed, efforts can be concentrated on the month of September. Trotline tags expire August 31 each year and all trotlines must have current tags in compliance with Texas law.

D. During periods when trotlines are not producing well, the use of illegal gill nets is common and places a heavy strain on the fishery since large numbers of fish can be taken in a short period of time. The National Park Service must assume responsibility for the control of this activity in its portion of the Laguna Madre; a responsibility presently assumed almost wholly by the State through its concurrent jurisdiction. The Service will need to commit additional manpower to the effort and obtain a more versatile, shallow draft patrol boat for this and similar activities.

22. Project: Waterfowl Management in the Laguna Madre

The Laguna Madre is a valuable waterfowl wintering area used by 70-80 percent of the redhead duck population of North America as well as large numbers of pintails, american widgeon, and lesser scaup. Stands of saline aquatic vegetation such as shoalgrass and widgeongrass make the vegetated shallows of the western boundary of the Seashore some of the best waterfowl habitat in the upper Lagoon.

Landfills, dredging with its creation of additional spoil, and the encroachment of drifting sands reduce the habitat necessary for the maintenance of waterfowl. Increasing human populations with more time for hunting is resulted in an increased demand for waterfowl. The trend in available habitat is downward while the demand for waterfowl continues to rise.

Action (Continue Maintenance)

A. The objectives of waterfowl management in the National Seashore will be harmonious with the general objectives of the Central Flyway management program. This program will be aimed at maintaining and increasing population levels of all waterfowl species, sound land and water uses, and the provision for fullest possible public use of the resources.

B. The Laguna Madre within the National Seashore will remain open to waterfowl hunting subject to the following conditions:

   a. No permanent blinds will be permitted within the National Seashore.

   b. North and South Bird Islands and the posted waters adjacent to these islands are closed to all hunting.

   c. National Park Service and State personnel will continue to evaluate the effects of hunting in the Seashore, and all or part of the area may be closed to hunting if conditions warrant.

C. National Park Service and State personnel will continue to maintain close cooperation with the Audubon Society to insure that the bird rookeries on North and South Bird Islands are protected, especially during the nesting season.

23. Project: Management of North and South Bird Islands

Two important natural islands, North and South Bird Islands, are located within the boundaries of the National Seashore. These islands are critically important bird nesting areas. South Bird Island provides the only nesting area on the Atlantic seaboard for the white pelican. The National Audubon Society leased these islands from the State of Texas some years ago for the protection of the white pelican. Under a Memorandum of Understanding between the National Park Service and the National Audubon Society, South Bird Island is administered by the Audubon Society, and Society Wardens patrol it during the nesting period. The National Park Service administers North Bird Island.

Increased use of the Intracoastal Canal for boating, sport and commercial fishing, and oil and gas interests will have an adverse impact on the birds that nest on these islands. It seems evident that this adverse impact is occurring at this time: a white pelican count in 1960 totaled 1,000 birds; the 1972 count indicated only 205 white pelicans.

Action (Research)

A. Initiate research, preferably by a Park Service biologist, to monitor the breeding bird colonies and to study the effects of impactions upon the nesting sites. Continue cooperation with Federal and State agencies in this endeavor.

B. Signs prohibiting people from approaching closer than 500 feet (153 m) to South Bird Island should be kept in good condition. These protective measures should also be presented in public contacts and interpretive programs.

C. All oil and gas activities in the vicinity of these islands must be closely regulated so the habitat and the birds will not be disturbed.

Research

A. Continue close observation and patrolling of these islands during the nesting season. Throughout the year, periodically check the islands and adjacent water and keep informed on any activities which may cause damage.

B. A careful bird census should be made each year during the nesting period by the park staff and trained professional bird counters. Population counts are very important and show trends. The counts should be coordinated with Dr. Hildebrand of the University of Corpus Christi.

C. After the nesting season the nests should be surveyed to collect remains of eggshells (and also eggs that haven't hatched) for

determining shell thickness. Eggshell thickness is very important in the perpetuation of the species; various pollutants are becoming involved in the food chains and decreasing eggshell thickness is one consequence. In addition to the eggs and shell fragments, all evidence of dead young birds should also be recorded and relayed to Welder Wildlife Refuge.

Fig. 9. THE ONLY WHITE PELICAN FLOCK TO NEST NEAR SALT WATER OCCUPIES LARGE ROOKERY ON SOUTH BIRD ISLAND.
PAIS Photo.

24. Project: Management of Insect Populations Necessary for Control of Insect Born Diseases

Response to mosquito and biting fly born disease outbreaks in the past has been largely based on the amount of public pressure brought to bear on the park. Response in the future should be guided by sound research to avoid disturbance of the ecological balance on the island.

Action (Research)

Upon completion of the research indicated below develop a plan of control for each of the indicated diseases, to be placed in effect upon confirmation of epidemic conditions which require positive action. Such plan will include method and scope of control, visitor notification and control if required, and public informational releases.

Research

A. Initiate research to study the parasitic insects found on the island and the endemic mammalian diseases which are present in the island mammals and insects.

B. Over a period of years establish the normal levels of mammalian diseases encountered.

C. Establish measurable means of detecting epidemic levels for all of these mammalian diseases which affect humans or could have economic impact. Such means should allow for rapid analysis in order to effectively respond to public pressure should an outbreak of disease occur in the coastal bend region of Texas.

25. Project: Management of a Successful Recreational Interpretive Program With the Least Amount of Impact and the Best Use and Understanding of the Resources.

Past history of the National Seashore shows a limited program format of interpretive services which has been largely informative natural history programs. Interest in interpretive services, understanding and use of this barrier island in the best possible way has been evidenced by not only the local citizenry, but also the park visitor. Studies are needed to provide this understanding of the park visitor in his pursuit for a quality recreational visit.

Action (Research)

Develop interest in studies aimed at visitors' interests, feelings about needs of interpretive services and visitor facilities. This would be investigated through some university in the state having suitable graduate status in related departments.

Continue to experiment with interpretive operations for desirable visitor program formats. Continue to have information relayed to staff from Seasonal Naturalists on visitor reaction, information and dialogue in light of programs.

Research

A. Initiate research to study the determinant factors in the park visitors' reasons and needs in coming to the National Seashore. Through this study develop a series of guidelines and their application.

B. Produce an interpretive program format based on "A" above for presentation to visitors at the Natioal Seashore. Evaluate results through attendance and dialogue as to eventual success.

C. Incorporate the above findings in the Interpretive Prospectus approach and eventual development facilities. This will provide the widest and best use for the resource and the visitors' understanding of this use.

Fig. 10a CONCENTRATION IN FRONT OF VISITOR CENTER AT MALAQUITE BEACH.

Fig. 10b MALAQUITE CAMPGROUND. TOP PHOTO IS CLOSE-UP OF AREA CIRCLED HERE. IS THIS WHAT VISITORS WANT? PAIS Photos.

# V. PROGRAMMING SHEETS AND RESEARCH PRIORITIES

ACTIVITIES AND 5-YEAR PROGRAMMING SHEET

| Pkg. No. | Area Priority | RMP Ref. No. | Project Title | Year 1 NPS M.Y. | Year 1 Cost/ $1000 | Year 2 NPS M.Y. | Year 2 Cost/ $1000 | Year 3 NPS M.Y. | Year 3 Cost/ $1000 | Year 4 NPS M.Y. | Year 4 Cost/ $1000 | Year 5 NPS M.Y. | Year 5 Cost/ $1000 | Date Submitted 10-237 10-238 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6 | Exotic Wildlife | .025 | .3 | .025 | .3 | .025 | .3 | .025 | .3 | .025 | .3 | |
| | | 8 | Peregrine Falcon | .05 | .6 | .05 | .6 | .05 | .6 | .05 | .6 | .05 | .6 | |
| | | 13 | Junk on Beach | .75 | 6.8 | .75 | 6.8 | .75 | 6.8 | .75 | 7.0 | .75 | 7.0 | |
| | | 14 | Oil and Gas Exploration on the Island | .1 | 1.2 | .1 | 1.2 | .15 | 1.8 | .15 | 1.8 | .15 | 1.8 | |
| | | 15 | Oil and Gas Exploration in Laguna Madre | .1 | 1.2 | .1 | 1.2 | .1 | 1.2 | .1 | 1.2 | .1 | 1.2 | |
| | | 16 | Spoil Bank Management | .5 | 6.0 | .6 | 7.2 | .5 | 6.0 | .4 | 4.8 | .3 | 3.6 | |
| | | 17 | Corps of Engineers Spoil Disposal Easement | .025 | .3 | .025 | .3 | .025 | .3 | .025 | .3 | .025 | .3 | |
| | | 18 | Pollution Control in Laguna Madre | .025 | .3 | .025 | .3 | .05 | .6 | .05 | .6 | .05 | .6 | |
| | | 20 | The Hole | .1 | 1.2 | .1 | 1.2 | .15 | 1.8 | .15 | 1.8 | .15 | 1.8 | |
| | | 21 | Fisheries Management | .1 | 1.2 | .1 | 1.2 | .1 | 1.2 | .1 | 1.2 | .1 | 1.2 | |
| | | 22 | Waterfowl Management in Laguna Madre | .1 | 1.2 | .1 | 1.2 | .15 | 1.8 | .15 | 1.8 | .2 | 2.4 | |

ACTIVITIES AND 5-YEAR PROGRAMMING SHEET

| Pkg. No. | Area Priority | RMP Ref. No. | Project Title | Year 1 NPS M.Y. | Year 1 Cost/ $1000 | Year 2 NPS M.Y. | Year 2 Cost/ $1000 | Year 3 NPS M.Y. | Year 3 Cost/ $1000 | Year 4 NPS M.Y. | Year 4 Cost/ $1000 | Year 5 NPS M.Y. | Year 5 Cost/ $1000 | Date Submitted 10-237 10-238 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | NS10 | Impact on Dunes and Beaches | | 11.7 | | 10.0 | | | | | | | |
| | 2 | NS19 | Hypersalinity of Water in Laguna Madre | | 3.25 | | 7.3 | | | | | | | |
| | 3 | NS1-A | Water Resources Inventory | | | | | | 3.5 | | | | | |
| | 4 | NS1-B | Geological Features and Processes | | | | | | 3 | | | | | |
| | 5 | NS1-C | Soils Inventory | | | | | | 3 | | 3 | | | |
| | 6 | NS1-D | Invertebrate Inventory | | | | | | | | | | | |
| | 7 | NS1-E | Fungi and Bacteria List | | | | | | .5 | | | | | |
| | 8 | NS7 | Role of Wildfire | | | | | | | | 5 | | 4 | |
| | 9 | NS4 | Veg. Cover and Effects of Grazing | | | | | | | | | | 5 | |
| | 10 | NS3 | Water Resources Analysis of Padre Island | | | | | | 5 | | 5 | | | |

ACTIVITIES AND 5-YEAR PROGRAMMING SHEET

| kg. o. | Area Priority | RMP Ref. No. | Project Title | Year 1 NPS M.Y. | Year 1 Cost/ $1000 | Year 2 NPS M.Y. | Year 2 Cost/ $1000 | Year 3 NPS M.Y. | Year 3 Cost/ $1000 | Year 4 NPS M.Y. | Year 4 Cost/ $1000 | Year 5 NPS M.Y. | Year 5 Cost/ $1000 | Date Submitted 10-237 10-238 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 11 | NS5 | Faunal Factors on Island | | | | | | | | | | 3 | |
| | 12 | NS9 | Atlantic Ridley Turtle Reestab-lishment | | | | | | | | | | 2 | |
| | 13 | NS23 | Management of North & South Bird Islands | | | | | | | | | | | |
| | 14 | NS12 | Completion of Resource Analysis | | | | | | | | | | | |
| | | NS2 | Climatic Variations | | | | | | | | | | | |
| | | NS11 | Dune Movement and Sand Accretion | | | | | | | | | | | |
| | | NS24 | Insect-Born Disease Research | | | | | | | | | | | |
| | | NS25 | Recreational Interpretive Program | | | | | | | | | | | |

## VI OVERVIEW

The following is a review of all actions proposed within the Padre Island National Seashore Natural Resources Management Plan, and outlined within the four categories described within the Management Program.

I. THOSE ACTIONS WHOSE IMPLEMENTATION WILL HAVE A SIGNIFICANT AND MEASURABLE EFFECT ON THE ENVIRONMENT.

No such actions are planned. Each project included in the Resource Management Plan was considered on its own merit, and in every case, those actions planned do not have a significant and measurable effect on the environment. All of the actions fall into categories II, III, or IV.

II. THOSE ACTIONS WHICH WILL CONTINUE EXISTING MAINTENANCE.

1. Natural Science (N.S.) project # 6 - EXOTIC WILDLIFE: The King Ranch stocks several species of exotic wildlife which occasionally cross the Laguna Madre to Padre Island. The NPS will continue to maintain liaison with wildlife managers of the King Ranch to prevent these exotic animals from becoming established on Padre Island.

2. N.S. Project # 8 - PEREGRINE FALCON: The Peregrine Falcon (Falco peregrinus) is a rare and endangered bird. This project will continue the patrolling of the island to prevent poaching and apprehend poachers. Several state, federal, and local organizations are involved in the control, censusing, and general welfare of this magnificant bird.

3. N.S. Project # 13 - HARMFUL MATERIALS WASHING IN ON THE BEACHES: The removal of trash, garbage, and chemicals of various kinds is a continual process on the beaches of Padre Island. The source of these pollutants will be determined when possible and court action initiated when the source can be determined.

4. N.S. Project # 14 - OIL AND GAS EXPLORATION ACTIVITIES ON THE ISLAND: As a result of the legislation which established Padre Island National Seashore, grants and easements for the surface exploration, development production, storage, processing or transporting of oil and gas are still outstanding. This project is designed to enhance the relationship between the NPS and various gas and oil companies in a mutual attempt to minimize environmental damage which results from oil-associated activities.

5. N.S. Project # 15 - LAGUNA MADRE OIL AND GAS EXPLORATION ACTIVITIES: This project is much like N.S. Project # 14 except the concern here is with the effect of dredging and drilling in the Laguna Madre. The deposition of spoil from dredging and the

furtherment of the directional drilling concept will be coordinated with appropriate agencies and private operators.

6. N.S. Project # 16 - SPOIL BANK MANAGEMENT: The management of existing spoil banks is important since these provide campgrounds for humans and nesting sites for birds. This program will also involve the Corps of Engineers to manage the spoil banks to provide nesting grounds which will not be disturbed during the breeding season.

7. N.S. Project # 17 - CORPS OF ENGINEERS SPOIL DISPOSAL EASEMENTS: This project is a public relation project to dispose of spoil in methods which will prevent pollution and destruction of bottom habitat.

8. N.S. Project # 18 - POLLUTION CONTROL IN THE LAGUNA MADRE: This public relation program will initiate discussions with oil and gas companies to insure that core cuttings, drilling muds, and other waste materials will be removed from the drilling sites and disposed of on land rather than in the Laguna Madre. The Texas Railroad Commission will be aided in their responsibility to insure that oil storage facilities are regularly inspected.

9. N.S. Project # 20 - THE HOLE: The "Hole" is a very productive fishing area into which a channel is periodically dredged to replace water which has evaporated during summer months. This project will continue the monitoring of this area to insure the quality of the water and proper concern for the environmental quality during oil and gas well drilling.

10. N.S. Project # 21 - FISHERY MANAGEMENT IN THE LAGUNA MADRE: This project will enlist the cooperation of the Texas Parks and Wildlife Department and commercial fishermen to manage the fisheries resource. The existing trotline fishery has caused mortality to waterfowl and the cooperation of commercial fishermen will be enlisted to curtail this loss.

11. N.S. Project # 22 - WATERFOWL MANAGEMENT IN THE LAGUNA MADRE: This program will be aimed at maintaining and increasing population levels of all waterfowl species in cooperation with State personnel and members of the Audubon Society.

III. THOSE ACTIONS WHICH WILL INITIATE NEW MAINTENANCE.

1. N.S. Project # 17 - CORPS OF ENGINEERS SPOIL DISPOSAL EASEMENTS: Closer liaison is proposed between the Corps of Engineers and the National Park Service to dispose of dredge spoil in a manner and in areas where disposal will least interfere with the habitat. A Memorandum of Agreement or Understanding is the proposed vehicle to accomplish this project.

IV. THOSE ACTIONS WHICH WILL ENTAIL RESEARCH.

1. N.S. Project # 1 - COMPLETION OF NATURAL RESOURCES BASIC INVENTORY: The lack of complete information on what natural resources occur in the park cannot help but severely hinder planning and decision making. This project proposes the completion of the area's basic natural resources inventory; e.g., inventory of the fungi and bacteria, birds, invertebrates (other than mollusks) geological features, soils and water resources.

2. N.S. Project # 2 - CLIMATIC VARIATIONS: The establishment of three weather stations on the island will give information on local weather conditions. This study is important because it serves as a basis for several other proposed projects; e.g., numbers 4,5,7, and 12. Owing to lack of personnel, only rain gauges will be utilized initially; other instruments will be installed when feasible.

3. N.S. Project # 3 - WATER RESOURCES ANALYSIS OF PADRE ISLAND: This study will inventory ponds and other water sources on the island and monitor these water sources for pollution. Cooperation with the Environmental Protection Agency and the Texas Water Quality Board will be solicited to thoroughly analyze the hydrologic regime of the island.

4. N.S. Project # 4 - VEGETATIVE COVER AND EFFECTS OF GRAZING: This project will initiate research to determine the extent of grazing damage and obtain data on the vegetative dynamics on the island. Research is planned to determine vegetative productivity, stand composition, succession, biomass, water and nutrient needs, and establish benchmarks for a future monitoring system to detect vegetative changes.

5. N.S. Project # 5 - FAUNAL FACTORS ON THE ISLAND: A faunal study includes data gathering and analysis of distribution and abundance of native animal species, population dynamics, migration, and immigration. This information may be considered to be basic data necessary for sound management of the island's ecosystem.

6. N.S. Project # 7 - THE ROLE OF WILDFIRE: This research proposal is meant to be correlated with project number 2-Climatic Variations-and will investigate the possibility of the use of fire as a tool to assist in the management of the Padre Island environments. Fire is an extremely sensitive tool for ecosystem management; to be utilized effectively, all the parameters must be studied prior to making a commitment.

7. N.S. Project # 9 - ATLANTIC RIDLEY TURTLE REESTABLISHMENT: The Atlantic Ridley Turtle (Lepidochelys kempi) once nested on Padre

Island but has nearly been extirpated in recent years. This project is concerned with investigating the possibility of reestablishment of this reptile.

8. N.S. Project # 10 - IMPACT ON BEACHES AND DUNES: This project is designed to stabilize dunes which obviously have been eroded by visitor activity and educating the visitor to the importance of the foredunes. Research is also planned to determine the effects of human activity on the ecology of the dunes, establish a carrying capacity, and investigate the flora-fauna relationships in dune areas.

9. N.S. Project # 11 - DUNE MOVEMENT AND SAND ACCRETION: The U.S. Corps of Engineers and the Gulf Universities Research Consortium are conducting research on the movement of beaches and dunes in the Gulf of Mexico. The goal of this project is to obtain and coordinate data pertaining to Padre Island and, in conjunction with other agencies, utilize these data for management purposes.

10. N.S. Project # 12 - COMPLETION OF RESOURCE ANALYSIS: This study is a final step in a comprehensive analysis of the ecosystems at Padre Island National Seashore. It is primarily involved in the measurement of energy input and flowthrough in the ecosystem and the nutrient and mineral cycles of that ecosystem. This project will, in all probability, never be completed since new data will be added to existing data as they become available.

11. N.S. Project # 19 - HYPERSALINITY OF WATER IN THE LAGUNA MADRE: The water of the Laguna Madre is normally hypersaline because of the restricted circulation and the absence of fresh water input. This project will initiate research into the circulation of the Laguna Madre and other facets of the hypersalinity and pollution of Laguna Madre, maintain liaison with State and Federal agencies involved with research on the Laguna and encourage stricter regulation of channelization and spoil deposition.

12. N.S. Project # 23 - MANAGEMENT OF NORTH AND SOUTH BIRD ISLANDS: This research project will initiate research to census, survey, and patrol these two islands which are important nesting sites for a variety of birds.

13. N.S. Project # 24 - MANAGEMENT OF INSECT POPULATIONS NECESSARY FOR CONTROL OF INSECT BORN DISEASES: This project will initiate research on parasitic insect populations and their effects upon small mammals and subsequent relations to humans. Recommendations on management of the animal forms and habitats for the protection of area visitors will be formulated.

14. N.S. Project # 25 - MANAGEMENT OF A SUCCESSFUL RECREATIONAL INTERPRETATIVE PROGRAM: The project will initiate research aimed at determining visitor's interests and needs of interpretive services and visitor facilities.

DETERMINATION: It is determined that all actions above are maintenance and research in character and do not significantly effect the environment or cause controversy. Therefore, in accordance to the following paragraph of "Guidelines for the Preparation and Review of Environmental Assessments and Statements" (National Park Service, July 29, 1974, pg. 6),

> "Based on an overview of all actions affecting the environment, the Responsible Official may determine that many plans, projects, and operational decisions have negligible potential to cause controversial or significant environmental impact and therefore do not require preparation of environmental assessments."

No Environmental Assessment will be prepared.

Recommended by: Robert H. Weaver Dec. 18, 1974
Chief Scientist, Southwest Region

Concurred by: John W. Hennebergen Dec 18, 1974
Associate Regional Director
Professional Services

Approved by: E R Thompson 12-23-74
ACTING Regional Director, Southwest Region

# APPENDIX A

## CONSTRAINT DOCUMENTS

Copies of these documents are available at either the Southwest Regional Office or the Office of the Seashore Superintendent.

## COMPLETED NATURAL RESOURCE RESEARCH

NOTE: Some of the following research projects were not done within the boundaries of Padre Island National Seashore. They are listed so that those using this Plan can refer to them when necessary. All are in the Padre Island National Seashore Library. Also, some of the projects are only partially completed, but progress reports are on file.

### GEOLOGY AND SOILS

1. Foley, William and Wells, David. 1973. A study of the Recent Sediments along the Gulf Coast of Texas from the Colorado River to the Rio Grande River.

   This is a study for a Master's degree at the University of Texas in Arlington. It was begun in the Spring of 1973. The two men were given a Collecting Permit from Padre Island National Seashore.

2. Price, W. Armstrong. 1953. Shorelines and Coasts of the Gulf of Mexico. Fishery Bulletin, No. 89, U. S. Fish and Wildlife Service.

3. Price, W. Armstrong and Gunter, Gordon. Certain Recent Geological and Biological Changes in South Texas, with consideration of Probable Causes. The Texas Academy of Science.

   This is an excellent account of the vegetative changes on Padre Island. Also discussed is the filling in of the Laguna Madre.

4. Hunter, Ralph E. and Dickinson, Kendall A. 1970. Map showing Landforms and Sedimentary Deposits of the Padre Island Portion of South Bird Island 7-5-Minute Quadrangle, Texas. Miscellaneous Geologic Investigations Map I-659. Published by the U. S. Geological Survey, Washington, D. C.

   An excellent work. Gives a geologic history of northern Padre Island, including the Malaquite Beach area of the National Seashore. Also includes a short description of landforms, sediments, and sedimentary processes. Includes a colored map of the area showing the geology.

5. McFarland, Wheldan H. 1971. Soil Properties on five different Range Sites on Padre Island National Seashore. A thesis presented in partial fulfillment of the requirements for the Degree of Master of Science at Texas A & I University.

   A study of the physical and chemical properties of the soils in the five major range sites on Padre Island National Seashore which have been classified as: (1) coastal dunes, (2) low coastal sands, (3) salt marsh, (4) salty sands, and (5) shoregrass flats.

## VEGETATION

1. Woodard, D. W., Dahl, B. E., and Baker, R. L. The Use of Grasses for Dune Stabilization Along the Gulf Coast with Initial Emphasis on the Texas Coast. Annual Reports for 1969, 1970, 1971, and 1972 to the U. S. Army Corps of Engineers.

   Reports on the procedures and results of sand dune building and stabilization. Some of the research is being done within the National Seashore near the Twin Tanks.

2. Rechenthin, C. A., and Passey, Howard, 1967. The Vegetation of Padre Island National Seashore. U. S. Soil Conservation Service.

   This study was made at the request of the National Park Service. It is excellent. It includes a general description of the ecology of the island with emphasis on the soils, the vegetation, vegetative types, a history of the island from the standpoint of what has happened to the vegetation. Included is a plant list. There is a set of aerial photos of the entire National Seashore which shows the vegetative types.

3. Higginbotham, Ira, Jr., 1972. An Analysis of the Vegetation of the Padre Island National Seashore. A paper presented in partial fulfillment of the requirements for the Course GNA 595, Texas A&I University.

   Higginbotham established ten permanent 100-foot transects in five vegetative sites in the National Seashore. The point frame method was used to measure the composition of the vegetation. Results of the first year's work are listed. (See No. 4 below)

4. Kattner, Kenneth R., 1972-1973. Secondary Succession of Vegetation on Padre Island National Seashore. A Master's Degree Thesis at the School of Agriculture, Texas A&I University.

   Kattner continues the work started by Higginbotham (See No. 3 above). In addition, he is conducting experimental burning and shredding of the grasses. He is also providing a herbarium collection of the plant species in and around the study area. (Future students will continue this work.)

## BIRDS

1. McMurry, Sharon L., 1971. Nesting and development of the Reddish Egret on a Spoil Bank Chain in the Laguna Madre. A thesis presented in partial fulfillment of the requirements for the Degree of Master of Science at Texas A&I University.

   This study was conducted on the same spoil island (and other nearby spoil islands) that Barnes studied (see Spoil Islands (Banks) No. 1). It covered two nesting seasons (1970 and 1971) and includes sections on the breeding population, breeding behavior, nesting, eggs, young, and breeding success.

   This study pertains and has applicability to the National Seashore.

2. Rogers, Ralph R., 1972. Levels of Organochlorines in Peregrine Falcons on the Texas Coast. Master's Thesis Study, Texas Tech University.

   Roger's plans were to trap peregrine falcons and take fat samples for determining the levels of organochlorines in the falcons. His plans were to trap falcons on Padre Island during October and November 1969 - 1971. (This study was done with the approval of Texas Parks and Wildlife Department and Padre Island National Seashore.)

   NOTE: This thesis is not in the National Seashore's library; it will be obtained.

## MISCELLANEOUS PEREGRINE FALCON STUDIES

1. James H. Enderson, Associate Professor of Biology, Colorado College, Colorado Springs, Colorado, has also captured (and released) peregrine falcons for the purpose of taking fat samples. We do not have copies of his work either.

## MAMMALS

1. Koepke, John F., 1969. The Mammals of Northern Padre Island and Nueces County, Texas. A research problem submitted to the Department of Biology in Partial fulfillment of the requirements for the Master of Science Degree, Kansas State College of Pittsburg, Pittsburg, Kansas.

   This study involved the trapping and identification and measurement of mammals at 11 different locations on Mustang Island, North Padre Island, and the mainland. None of the locations were on the National Seashore; however, the study was conducted very near the Seashore and is applicable to the Seashore.

## SPOIL ISLANDS (BANKS)

1. Barnes, Diana, 1971. Anatomy of a Spoil Island. A Thesis presented in partial fulfillment of the requirements for the Degree of Master of Science at Texas A&I University.

   This research was conducted on a spoil island near Marker #105 in the Intracoastal Waterway in the Laguna Madre. This spoil island is just a few miles south of the National Seashore boundary. The island is similar to the spoil islands in the National Seashore.

   The study describes the topography, freshwater ponds, and vegetation.

2. Mendoza, Carlos H. and Ortiz, Rene R., 1973, 1974. A survey of Spoil Banks in the Upper Laguna Madre in Relation to Island Size and Shape, Vegetation Distribution and Bird Habitat Distribution. Master's thesis for the Department of Biology, Texas A&I University, Kingsville, Texas.

   This project was begun in the Spring of 1973. Part of the study area is in the northern part of the National Seashore. The two researchers have been issued Collecting Permits.

## COOPERATIVE TEXAS FISHEATING BIRD SURVEY

This survey, taken in May and June, was begun in 1967 and held each year since. The survey is made by air, boat, car and walking parties. The entire Texas Coast is surveyed.

The purposes of the count are:

1. To provide an index to population trends; taking special note of decreasing population levels.

2. To stimulate interest and research in fisheating birds.

3. To gain a better understanding of distribution.

4. To hopefully lead to appropriate management.

National Seashore personnel participate in the survey, and the Laguna Madre portion of the National Seashore is included in the survey.

## GHOST CRABS

1. Teerling, Joyce, 1970. The Incidence of the Ghost Crab on the Foreshore of Padre Island and Some of its Responses to Man. A Master's Degree Thesis at Texas A&I University, Kingsville, Texas.

   This study involved the relationships between the numbers of people using the beaches at Padre Island in relation to the numbers of ghost crabs. It was found that the greater the density of people, the lesser the number of ghost crabs.

   It was thought that the ghost crab might be used as a "key species" with regard to the people carrying capacity of the beach.

2. Hill, Gary W. and Hunter, Ralph E. Burrows of the Ghost Crab on the Barrier Islands, South Central Texas Coast. Authors are U. S. Geological Survey employees; this report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards.

   This study was made on Mustang Island and Padre Island National Seashore.

   It lists some observations on the orientation, distribution, and morphology of ghost crab burrows as related to zonations of the beach environment.

## FISH

1. Turner, Robert O. Checklist of Marine Fishes Found at the Jetties, Offshore Rigs, and the Reef of the Texas Coast.

2. Causey, Billy D., 1969. The fish of Seven and One-half Fathom Reef. A thesis for the Master of Science Degree, Texas A&I University, Kingsville, Texas.

   The Seven and One-half Fathom Reef is in the Gulf of Mexico, offshore from Padre Island National Seashore. It is located about 17 miles north of the Mansfield Channel. It is not within the National Seashore boundary, but is a part of the story of the Padre Island area.

   Eighty-seven (87) species of fish were collected or observed at the reef; of this number, 13 were unrecorded and nine were seldom recorded species for the Northwestern Gulf of Mexico.

## DECAPOD CRUSTACEANS

1. Felder, Darryl L., 1971. The Decapod Crustaceans of Seven and One-half Fathom Reef. A thesis for the Master of Science Degree at Texas A&I University.

   The Seven and One-half Fathom Reef is in the Gulf of Mexico, offshore from Padre Island National Seashore. It is located about 17 miles north of the Mansfield Channel. It is not within the boundary of the National Seashore, but is a part of the natural history story of the Padre Island area.

   In this research, 58 species of Decapod Crustaceans were identified; 14 of the species had not been previously reported from the Texas coast.

## MOLLUSKS

1. Tunnell, John W., Jr., 1969. The Mollusks of Seven and One-half Fathom Reef. A thesis for the Master of Science Degree, Texas A&I University, Kingsville, Texas.

   The Seven and One-half Fathom Reef is in the Gulf of Mexico, offshore from Padre Island National Seashore. It is located about 17 miles north of the Mansfield Channel and about two miles east of the island. It is not within the National Seashore boundary, but is a part of the story of the Padre Island area.

   One hundred sixty-six (166) species were found; 32 species had not been previously reported as occurring along the Texas coast.

APPENDIX C

COLLECTIONS AND LOCATIONS

| Collection | Location |
|---|---|
| Shells - Mollusks | Headquarters, Padre Island National Seashore |
| Insects | Headquarters, Padre Island National Seashore |
| Herbarium | Headquarters, Padre Island National Seashore |
| Reptiles | Headquarters, Padre Island National Seashore |
| Birds | Welder Wildlife Refuge, Sinton, Texas |
| Mammals | Welder Wildlife Refuge, Sinton, Texas<br>and<br>Kansas State College, Pittsburg, Kansas<br>(John Koepke's Collection) |

APPENDIX D

SPECIFIC MANAGEMENT PLANS

On file at the Southwest Regional Office:

1. Hurricane Preparedness Plan - 1971*

2. Documented Safety Program - 1972*
   - I. Motor Vehicle Accidents
   - II. Accidents Other Than Motor Vehicle
   - III. Employee Accidents
   - IV. Structural Fire Control Plan
   - V. Grassland Fire Control Plan
   - VI. Emergency Action Plans

*Both of these plans are being revised to be included in a comprehensive Emergency Operations Plan, which will cover fire, floods of all types, hurricanes, and search and rescue operations. This plan is expected to be completed in Spring 1975.

APPENDIX E

ANNUAL REVIEW, CHANGES AND DATES

The Resource Management Plan will be reviewed annually by the Superintendent and the Regional Natural Resources Management Plan Coordinator. Necessary changes will be initiated at the area for approval of the General Superintendent and the Regional Director.